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STATE OF CALIFORNIA
Resources Agency
Department of Fish and Game

Guidelines for Temporary Water Drafting from Streams and Rivers
Supporting Anadromous Salmonids;
Special Application for Timber Harvest Activities

by

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Preliminary Draft - Subject to Revision

The purpose of this paper is to provide concise and updated criteria for protecting anadromous salmonids from impacts associated with water drafting. Criteria in this report are directed at anyone responsible for operating, permitting or overseeing small, temporary water diversion projects associated with timber harvest activities in coastal timberlands supporting salmon, steelhead or other important aquatic resources. Information in this report may not be applicable to water diversion projects in other locations. Criteria in this paper may change as a result of improved biological knowledge and/or changes associated with state or federal regulation.

Laws and policies governing the Department of Fish and Game (Department) in this matter include Section 1600 et seq. and Section 6100 of the Fish and Game Code, Section 703 of the Fish and Game Code (specifically the policies identified as “Salmon”, “Steelhead Rainbow Trout”, “Endangered and Threatened Species”, “Water”, and the “Joint Policy Statement on Coho Salmon” between the California State Board of Forestry and the California Fish and Game Commission). Fish and Game Code Section 1600 et seq. requires that the Department enter into an agreement with a person proposing to, among other actions, substantially divert or obstruct the natural flow of a river, stream, or lake. This includes water drafting. Applications can be obtained from a Department office.

Streams and rivers are used as water sources for timber harvest operations in coastal California. Water is used by itself or in combination with additives to minimize dust and improve running conditions on unpaved roads. Watering roads for dust abatement is often an enforceable condition for approved timber harvest plans. In addition to roads, water may be used in conjunction with controlled burns, wildfire suppression and watering for revegetation projects.

The typical water drafting system for a timber harvest operation involves a truck outfitted with a three to four thousand gallon storage tank, a truck-mounted centrifugal pump and an extendable intake hose. Pools are often targeted for diversion sites because they have sufficient volume to permit high diversion rates. Operators often pump at or near maximum rates to limit down time, thereby maximizing the amount of road surface that can be watered in a given period. To prevent damage to the pump, operators avoid entraining rocks or air during pumping. Typically, an operator will back next to or pull alongside a pool, position a hose with the intake end near the bottom of a pool and commence pumping. Depending on the size and condition of the pump, an operator may fill a four thousand gallon water truck in 10 to 20 minutes. For most systems, the drafting rate can be adjusted.

The following three variables should be considered when designing a small, portable water drafting operation; 1) screen size, 2) approach velocity and 3) diversion rate. The following criteria for screen size, approach velocity and diversion rate are designed to protect fry-size salmonids from water diversion activities in California’s timberlands. Use of these criteria may protect other species which occupy the same streams and lakes.

Screen Mesh Size:

Openings in perforated plate and woven wire screens shall not exceed 3/32 inches (2.38 millimeters). Slot opening in wedge wire screens shall not exceed 1.75 mm.

To prevent entrainment of fish during water diversion, the pump intake shall be fitted with screen made of woven mesh, perforated plate, wedge wire, or other durable fabric. The screen medium shall be able to withstand forces related to pumping and be of sufficient size to prevent small fish from entering the intake and being pumped along with diverted water.

Approach Velocity:

The velocity of water across the screen surface shall not exceed 0.33 feet/second at any point on the screen surface. To achieve this standard, the screen shall be kept clean and free of accumulated algae, leaves or other debris which could block portions of the screen surface and increase approach velocities at any point on the screen. The screen shall be supported above the bed of the streams so that no part of the screen surface is obstructed. Water truck operators shall move drafting hoses with attached screens in and out of the water after each drafting operation. The screen should be brushed clean and inspected each time it is placed into the water. This practice will usually prevent screens from accumulating significant amounts of debris and essentially replicate the function of a self-cleaning screen. Where a stationary pump is used, the screen should be checked frequently to ensure it is kept clean and free of debris.

Diversion Rate:

Water drafting may cause adverse impacts to juvenile salmonids if flow in source streams is reduced to insufficient levels. For these cases, a specific water drafting plan shall be developed. Concerns over impacts caused by reduced flows and the subsequent need for a water drafting plan may not be necessary if the proposed water diversion conforms to the following standards:

- a. Flow in the source stream during water drafting will remain at 2.0 feet³/second or greater, or
- b. If diverting from a pool, reduction in pool volume will not exceed 10 percent, or
- c. Diversion rate will not exceed 10 percent of the surface flow from the source stream, or
- d. Instantaneous diversion rate is less than 350 gallons per minute (0.78 feet³/second)

For water diversion projects that will not meet criteria a through d above, a water drafting plan shall be prepared and approved by the Department through an Agreement pursuant to Section 1600 et seq. of the Fish and Game Code. This plan shall include the following:

- i. Determine the instantaneous flow reduction and duration of reduction from the source stream.

- ii. Disclose potential impacts associated with both the instantaneous flow reduction and cumulative flow reduction and total volume removed from the source stream.
- iii. Identify proposed recommendations for minimizing adverse impacts such as a reduced hose diameter, decrease in pumping rates, use of alternative sites and/or restrict number of water withdraws from one location.
- iv. Require operators to maintain a water diversion log which records the date, time, pump rate, filling time, screen cleaning and inspection, and bypass flow from the source stream.
- v. Conduct a pre-operations briefing with personnel who will be operating water drafting equipment and charged with compliance of the water diversion plan.

Additional Considerations :

While outside the scope of this report, standards for protecting anadromous salmonids may also be sufficient for protecting other species of fish, amphibians, reptiles and invertebrates. These considerations should be made on a case-by-case and species-by-species bases.

In certain situations and at specific sites, the requirement for screen and approach velocity criteria may be disregarded if an approved watering hole or sump is constructed adjacent to a stream or river. Large gravel bars adjacent to streams may be appropriate sites for constructing temporary water drafting holes. Unaltered sections of the gravel bar which lie between the watering hole and the flowing stream may provide the functional equivalent of a screen. In addition, approach velocities along the gravel bar must meet Department standards (e.g. < 0.33 feet/second for fry-size fish). Construction and use of these watering holes will be restricted to summer periods when storms and increasing stream flows are uncommon. Pursuant to Section 1600 et seq. of the Fish and Game Code, construction and use of watering holes will likely require a Lake and Streambed Alteration Agreement.

Example for Calculating Surface Area for Intake Screens:

The purpose of this example is to outline steps for calculating the appropriate screen surface area necessary to meet Department guidelines for approach velocities.

Scenario:

A water drafting operation will use a 4,000 gallon truck to divert water from a small stream which supports fry-size salmon and steelhead. At the maximum rate, the truck can be filled in 15 minutes. Calculate the surface area of screen necessary to comply with Department guidelines for approach velocities not to exceed 0.33 feet/second.

Step 1:

Calculate diversion rate in gallons per minute (gpm) with the pump running at full capacity.

$$\frac{4,000 \text{ gallons}}{15 \text{ minutes}} = 266.7 \text{ gpm}$$

Step 2:

Convert diversion rate from gpm to feet³/second (cfs). Note, to convert gpm to cfs, multiple the gpm figure by 0.00223.

$$266.7 \text{ gpm} \times 0.00223 = 0.59 \text{ cfs}$$

Step 3:

Using the maximum acceptable approach velocity of 0.33 feet/second, calculate how much surface area of screen is needed for a diversion rate of 0.59 cfs.

$$\frac{0.59 \text{ feet}^3/\text{second}}{0.33 \text{ feet/second}} = 1.79 \text{ feet}^2 \text{ (square feet)}$$

Answer: For this example, a screen surface area of 1.79 square feet or larger will satisfy the Department's standard for approach velocity.